

Appendix 8

Permeable Hot-mix Asphalt Sample Specification

Origin: Cahill Associates, Westchester, Pennsylvania (Cahill Associates, Section 02725-General porous paving and groundwater infiltration beds, 2004).

Application: Parking lots with aggregate base for retention storage.

Soil infiltration rate: Required soil infiltration varies depending on contributing area, aggregate base storage and infiltration capacity, and design storm. In general, minimum long-term infiltration rate should be 0.1 inch/hour.



Figure 1 Parking installation, *Courtesy of Cahill Associates*

Top course: 2.5 inches thick

Aggregate grading:	U.S. Standard Sieve	Percent Passing
	1/2	100
	3/8	92-98
	4	32-38
	8	12-18
	16	7-13
	30	0-5
	200	0-3

Bituminous asphalt cement

- 5.75% to 6.00% by weight dry aggregate.
- Drain down of asphalt binder should be no greater than 0.3% in accordance of ASTM D6390.
- Use a neat asphalt binder modified with an elastomeric polymer to produce a binder meeting requirements of performance or PG 76-22 (PG recommendation for mid-Atlantic states).
- Elastomeric polymer is a styrene-butadiene-styrene or equal applied at a rate of 3% by total weight of the binder. Thoroughly blend polymer and binder at asphalt refinery prior to loading and transportation. The polymer modified asphalt binder should be heat and storage stable.
- Hydrated lime is added at a rate of 1.0% by weight of the total dry aggregate to mixes with granite stone to prevent separation of the asphalt from the aggregate and achieve a required tensile strength ratio of at least 80%. Hydrated lime should meet ASTM C 977.
- The asphalt mix should be tested for resistance to stripping by water in accordance with ASTM D 3625. If estimated coating area is not above 95%, anti-stripping agents should be added to the asphalt.

Asphalt installation

- Bituminous surface course mix is laid in one 2.5-inch lift directly over aggregate storage base.
- Laying temperature of the mix should be between 240 and 250 degrees Fahrenheit and ambient temperature should not be below 40 degrees Fahrenheit.
- Compaction of the surface course should occur when the surface is cool enough to resist a 10-ton roller. One or two passes is all that is required for proper compaction and additional rolling can cause a reduction in surface course porosity.

Aggregate base/storage bed material

- Coarse aggregate is 0.5- to 2.5-inch uniformly graded stone with a wash loss of no more than 0.5% (AASHTO size number 3).

Aggregate grading:	U.S. Standard Sieve	Percent Passing
	2 ½"	100
	2"	90-100
	1 ½"	35-70
	1"	0-15
	½"	0-5

- Choker base course aggregate should be 3/8- to 3/4-inch uniformly graded stone with a wash loss of no more than 0.5% (AASHTO size number 57).

Aggregate grading:	U.S. Standard Sieve	Percent Passing
	1 ½"	100
	1"	95-100
	½"	25-60
	4	0-10
	8	0-5

Aggregate base/storage installation

- Stabilize area and install erosion control to prevent runoff and sediment from entering storage bed.
- Existing subgrade under base should NOT be compacted or subject to excessive construction equipment traffic prior to installation.

- Storage bed should be excavated level to allow even distribution of water and maximize **infiltration** across parking entire area.
- Immediately before base aggregate and asphalt placement remove any accumulation of fine material from erosion with light equipment and scarify soil to a minimum depth of 6 inches.
- Geotextile fabric is a Mirafi 160N or approved equal. Overlap adjacent strips 16 inches and secure fabric 4 feet outside of storage bed to reduce sediment input to bottom of area.
- Install course (0.5 to 2.5 inch, AASHTO size number 3) aggregate in lifts no greater than 8 inches and lightly compact each lift.
- Install 1-inch choker course (No. 8 to 1.5-inch aggregate, AASHTO size number 57) evenly over surface of course aggregate base.
- Storage and infiltration bed depth will depend on infiltration rates, storage requirement and design storm; however, Cahill Associates often install 18- to 36-inch sections designed for full retention of storm flows.
- All erosion and sediment control should remain in place until area is completely stabilized with soil amendments, landscaping or other approved controls.

Backup systems

- For backup infiltration capacity (in case the asphalt top course becomes clogged) an unpaved stone edge is usually installed that is hydrologically connected to the storage bed (see Figure 2).

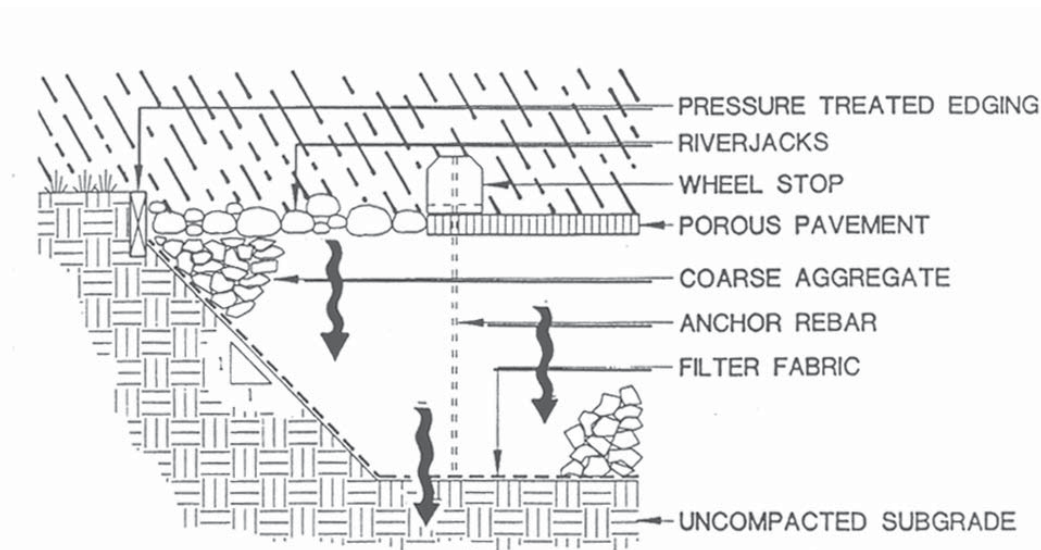


Figure 2 Backup infiltration system for permeable parking lot installations.

Graphic courtesy of Cahill Associates

- To ensure that the asphalt top course is not saturated from high water levels in the aggregate base (as a result of subgrade soil clogging), a positive overflow is usually installed.

Cahill Associates design some systems to infiltrate storm flows from adjacent buildings. Water is collected from roof downspouts, conveyed through a catch basin (to remove debris), and distributed in perforated pipes throughout the storage and infiltration aggregate base.

